



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/521,453

01/14/2005

Shigeo Maruyama

1152-0314PUS1

8796

2292 7590 05/28/2008
BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

MCCRACKEN, DANIEL

ART UNIT

PAPER NUMBER

1793

NOTIFICATION DATE

DELIVERY MODE

05/28/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/521,453	Applicant(s) MARUYAMA ET AL.	
	Examiner DANIEL C. MCCracken	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-23 and 25-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-23, 26-33, 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 25, 34 and 36 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Citation to the Specification will be in the following format: (S. # : ¶/L) where # denotes the page number and ¶/L denotes the paragraph number or line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Election/Restrictions

Newly submitted claims 25, 34, and 36 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Applicants have *now* amended the laundry list of unit operations found in *e.g.* Claims 12-13 (now cancelled) to recite an apparatus, *i.e.* a reactor. The method of all other currently pending claims can be practiced by any number of nanotube/nanofiber reactors. *See e.g.* US 6,919,064 to Resasco, et al. Furthermore, the “common technical feature” between all claims, *i.e.* “fine carbon fibers,” are old and known. *See* any of the documents provided in Applicants IDS or already of record.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 25, 34, and 36 are withdrawn from consideration as being directed to a non-elected invention. *See* 37 CFR 1.142(b) and MPEP § 821.03.

Response to Arguments

Claim Rejections 35 U.S.C. §§102-103, 112

Applicants have cancelled the independent claims that formed the basis for all rejections in the non-final office action of 10/22/2007, presumably for purposes of patentability to correct the incomprehensible claims, rendering the rejections moot. As such, all rejections are withdrawn. New rejections appear forthwith. Hence, the arguments are moot.

Applicants state in their remarks that they “are not aware of any precedent or a requirement of providing specific citations to the specification to support claim amendments.” (Remarks of 2/22/2008, p. 16). In fact, the Manual of Patent Examining Procedure states: “Applicant should also specifically point out the support for any amendments made to the disclosure.” MPEP 714.02. Of course, this is non-mandatory language in a manual that does not have the force and effect of law. That said, there is a good reason for requesting it – especially for poorly translated, garbled and unintelligible foreign applications - namely the issue of new matter. Applicants cooperation is expected.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 16-23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1793

With respect to Claims 16-23, the “reacted gas” is not a gas; it is a carbon nanotube/fiber. Are Applicants recycling carbon nanotubes in some perpetual, continuous loop? For completeness, it was presumed that Applicants meant “unreacted gas.”

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The reference teaches each and every limitation of the rejected claims. The pinpoint citations are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 14-23, 26-33, and 35 rejected under 35 U.S.C. 102(e) as being anticipated by US 6,919,064 to Resasco in view of Dresselhaus, et al., *Science of fullerenes and carbon nanotubes* 756-776 (Academic Press 1996) (hereinafter “Dresselhaus at __”) to show a state of fact.¹

With respect to Claim 33, Resasco discloses a method for making carbon nanotubes wherein an oxygen containing organic compound (i.e. "an IUPAC group 16 periodic table element") is thermally decomposed with the aid of a transition metal catalyst. *See e.g.* (Resasco 6: 50-56) (thermal decomposition), (Resasco 6: 63 – 7:64) (catalyst – note transition metals are

Art Unit: 1793

taught at least at 7: 1-12), *and* (Resasco 7: 65—8: 10) (teaching alcohols and ketones). Resasco recites any number of collecting and separating steps, and the apparatuses for accomplishing them. *See e.g.* (Resasco “Figs 2-5,” 13: 35 *et seq.*) Other embodiments in Resasco may disclose collecting and separating, and Applicants are put on notice that the entire document is considered relevant. Note that Resasco teaches cooling. *See e.g.* (Resasco 9: 35-36). Finally, any number of recycle loops are taught. *See e.g.* (Resasco “Figs 2-5,” 13: 49-51) *and* (Resasco “Abstract”) (“The process also contemplates *processes and apparatus which recycle and reuse the gases and catalytic particulate materials, thereby maximizing cost efficiency, reducing wastes, reducing the need for additional raw materials, and producing the carbon nanotubes, especially SWNTs, in greater quantities and for lower costs.*”) (emphasis added). As to Claim 16 and 20, Resasco discloses any number of conversions and yields in the Examples presented. *See e.g.* (Resasco 15: 55-58, 16: 1-11, 18: 67 - 19: 2, 19: 38-61, “Figs 6-10”). Thus, given that Resasco discloses recycle streams, it is necessarily expected that unconverted feed in the amount of 50% or more is recycled. This (the conversions and the presence of a recycle stream) is the evidence offered to show inherency. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). Here, the “product” is the composition of

¹ Multiple reference 35 U.S.C. 102 rejections are proper when extra references are cited to explain the meaning of a

Art Unit: 1793

gas in the Resasco recycle stream. As to Claims 27 and 30, note that Resasco discloses the production of “SWNTs” or “single walled nanotubes.” *See e.g.* (Resasco 6: 23) (“production of SWNTs”). The claimed diameters for single walled nanotubes are unremarkable. *See e.g.* (Dresselhaus at 769-770, “Fig 19.8”) (note histogram of SWNT) *and* (Resasco 2: 12). Furthermore, claiming an “axial chiral structure” says nothing, as all nanotubes are of one three generally recognized chiral types. *See* (Dresselhaus at 758, “Fig. 19.1,” caption) (noting armchair, zigzag and chiral carbon nanotubes). No weight is being given to “axial” - this is presumably some “lost in translation” word that might mean something in Japanese. Regardless, it is mentioned once in the specification at (S. 14: 25), and is not defined. If Applicants argue “chiral,” they should be prepared for a battery of rejections under 35 U.S.C. 112 ¶¶ 1-2. Finally, with respect to Claim 32, note that while Resasco is directed in large part to single-walled nanotubes, it discloses “nanotubes” in both the generic (i.e. “nanotubes”) and the specific (i.e. “SWNT”). *See e.g.* (Resasco 2: 53-60). Further, Resasco recognizes that which is well known in the art – namely any of the processes for making carbon nanotubes makes all different types: single-walled, multi-walled, etc. This principle is recognized at (Resasco 2: 31-34). Thus, Resasco necessarily discloses multi-walled nanotubes (i.e. there are two “kinds” of nanotubes; single-walled and multi-walled). The claimed diameters are equally unremarkable for multi-walled nanotubes. *See* (Dresselhaus at 762, “Fig. 19.3”).

With respect to Claim 35 and 14-15, to the extent that Claim 35 repeats limitations discussed previously, the preceding analysis is relied upon. It is expected that cooling chamber/gas at, *e.g.* (Resasco 9: 35-36) provides the cooling necessary to condense whatever gas

Art Unit: 1793

is being claimed. Note that once a fluid is condensed, droplets running down the wall of a reactor can be construed as a "moisture separator." As to Claims 17-19, and 21-23, see discussion of recycle above. As to Claim 26, note the discussion of a porous material at *e.g.* (Resasco 9: 18 *et seq.*) As to Claims 28, 29 and 31 see discussion and references related to diameter, above.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. The references cited teach each and every limitation of the rejected claims. The pinpoint citations are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found. As to the rejection under 35 U.S.C. §§ 102/103, where the applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the Examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. See MPEP 2112 III. (discussing 102/103 rejections).

Claims 14-23, 26-33, and 35 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over 6,919,064 to Resasco in view of Dresselhaus, et al., *Science of fullerenes and carbon nanotubes* 756-776 (Academic Press 1996).

The preceding discussion accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. See above with respect to 102/103 rejections.

Claims 14-23, 26-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,919,064 to Resasco in view of Dresselhaus, et al., *Science of fullerenes and carbon nanotubes* 756-776 (Academic Press 1996), US 6,761,870 to Smalley, et al., Choi, et al., *Controlling the diameter, growth rate, and density of vertically aligned carbon nanotubes synthesized by microwave plasma-enhanced chemical vapor deposition*, Applied Physics Letters 2000; 76(17): 2367-2369 (hereinafter “Choi at ___”) and Bower, et al., *Nucleation and growth of carbon nanotubes by microwave plasma chemical vapor deposition*, Applied Physics Letters 2000; 77(17): 2767-2769 (hereinafter “Bower at ___”).

The preceding discussion accompanying the anticipation rejection *supra* is expressly incorporated herein by reference. With respect to Claims 16-23, to the extent Resasco *may* not disclose recycle of the gases in the ratios claimed, Resasco does provide extensive kinetic data and relationships. *See e.g.* (Resasco 14: 55 *et seq.*, 4: 28-30, “Figs 6-10”). Recycling a stream - in addition to the advantages noted in the Abstract – affects the concentrations/partial pressures of components, which in turn affects the rates of reaction. Optimization of this does not impart patentability. *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980). Furthermore, with respect to Claims 28-32, to the extent Resasco *may* not necessarily disclose the claimed diameter of the resulting nanotube, the diameter of the catalyst controls the diameter of the nanotube. To the extent Resasco may not teach this, the Examiner takes official notice that this parameter is old and known. In support of taking official notice (i.e. in making sure there is substantial evidence on the record), the Examiner cites to US 6,761,870 to Smalley, et al. at 8: 58 *et seq.*: “Generally, the diameter of the growing nanotube is proportional to the size of its active catalyst cluster at

Art Unit: 1793

the time the tube starts to grow.” It should be noted that this parameter is well described in the non-patent literature as well. *See e.g.* (Choi at 2369) (“Thus, the diameter of a carbon nanotube is determined by the grain size of catalyst metals.”) *and* (Bower at 2767) (“We found that the nanotubes grow via a “base growth” mechanism in our CVD system, and *there is a strong correlation between the catalyst metal layer thickness and the nanotube diameter.*”) (emphasis added). Stated differently, catalyst size is a result-effective variable. With this teaching littering the prior art, optimizing the diameter of the resulting carbon nanotube is well within the ordinary skill in the art. *See In re Boesch*, 205 USPQ 215, 219 (CCPA 1980).

Conclusion

All amendments made in response to this Office Action must be accompanied by a pinpoint citation to the Specification (i.e. page and paragraph or line number) to indicate where Applicants are drawing their support.

Applicant's amendment/response necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 1793

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL C. MCCrackEN whose telephone number is (571)272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel C. McCracken/
Daniel C. McCracken
Examiner, Art Unit 1793
DCM

/Stuart Hendrickson/
Stuart L. Hendrickson
Primary Examiner